Sequence 1 : Introduction to linear programming using GAMS

Unit 1 : Constrained optimization

Lesson 3 : One solution, several solutions, no solution ?

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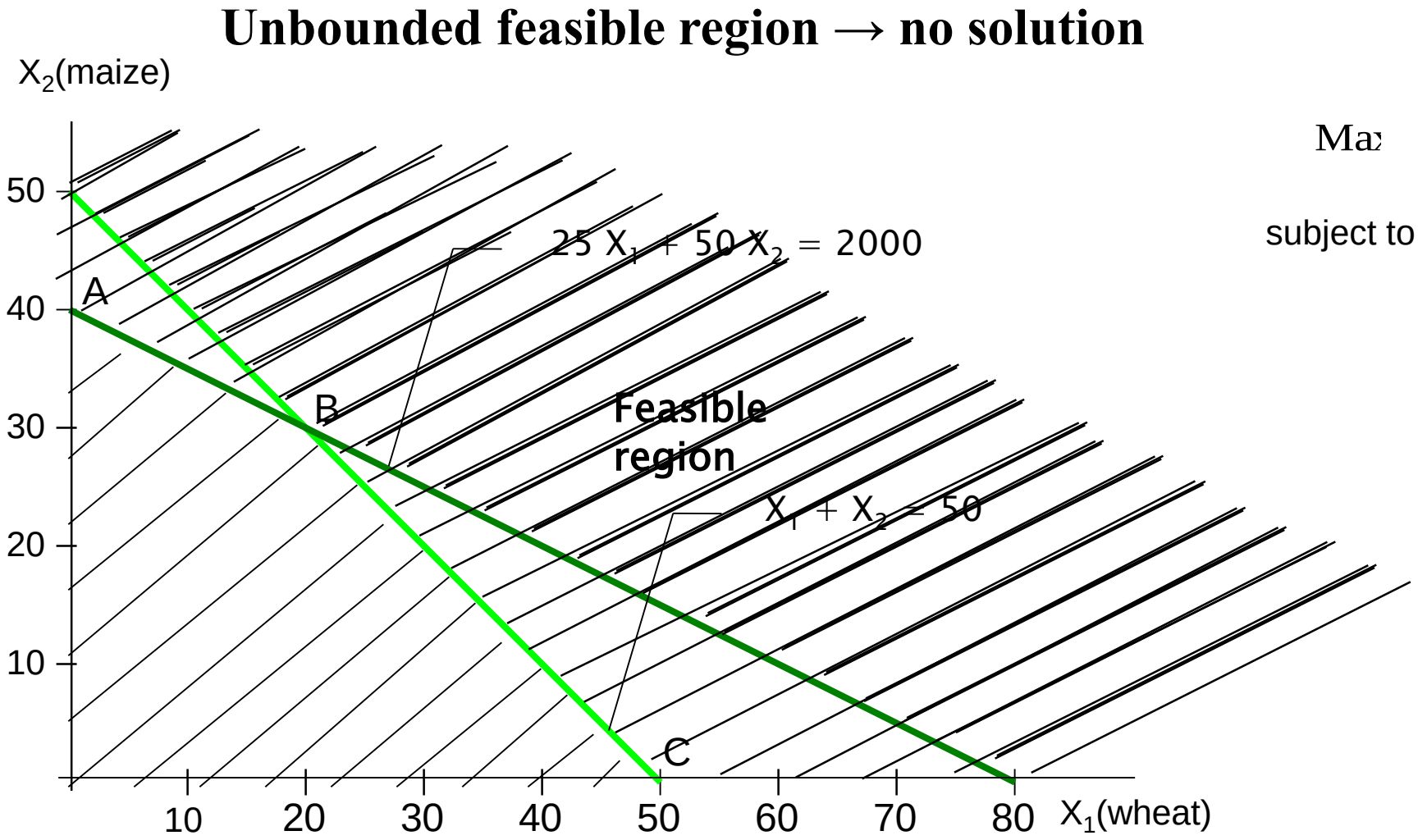
ModelEco

Unbounded problem



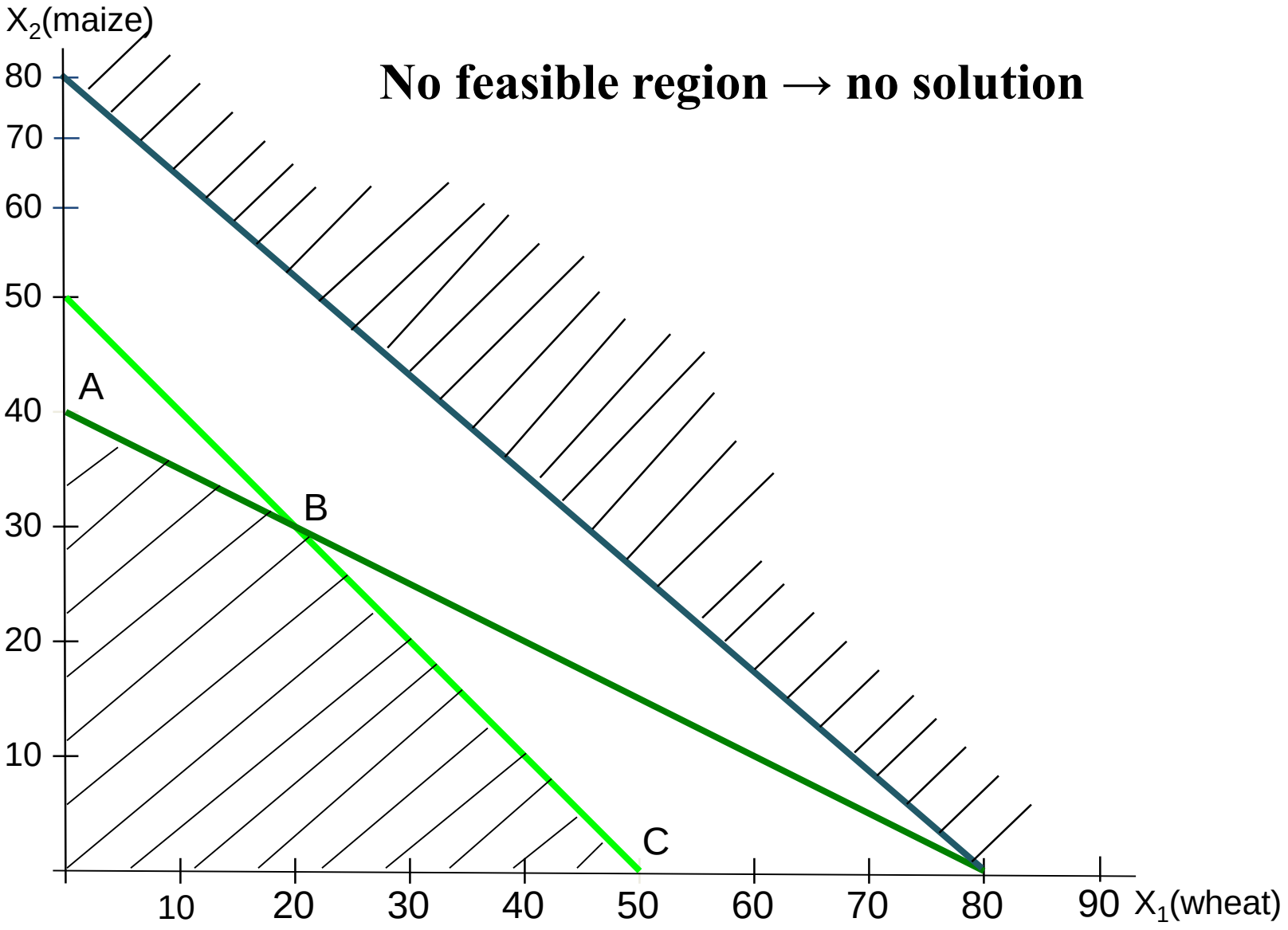
$$\text{Max} \quad Z = 450\ X_1 + 1000\ X_2$$

subject to

$$X_1 + X_2 \geq 50$$

$$25\ X_1 + 50\ X_2 \geq 2000$$

$$X_1 \geq 0\ ;\ X_2 \geq 0$$



No feasible region → no solution

Infeasible problem

Maximiser $Z = 450\ X_1 + 1000\ X_2$

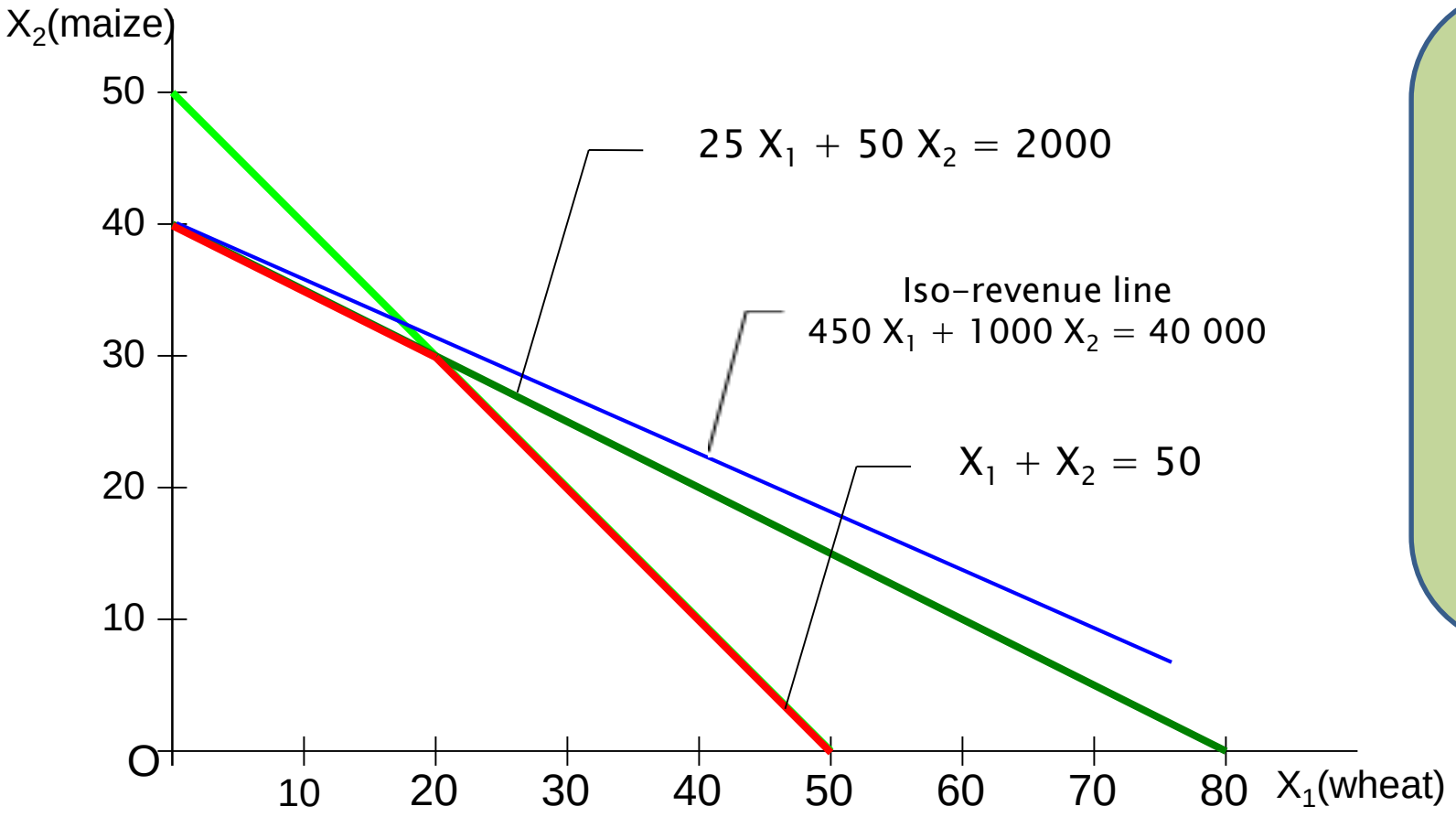
subject to $X_1 + X_2 \leq 50$

$25\ X_1 + 50\ X_2 \leq 2000$

$X_1 + X_2 \geq 80$

$X_1 \geq 0\ ;\ X_2 \geq 0$

Change in the Objective Function slope (1)



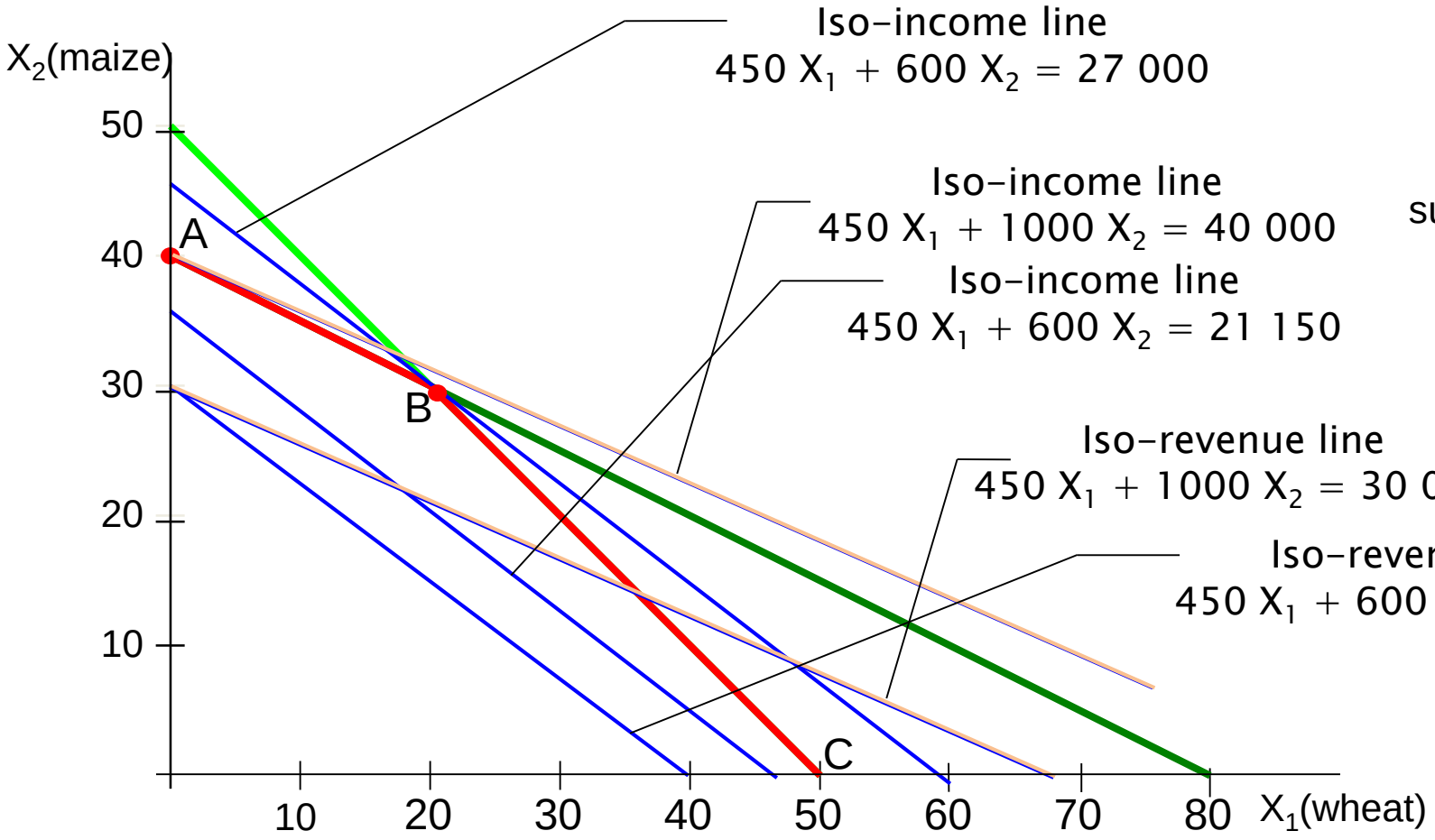
The gross margin of maize goes from 1000 to 600 euros

What happens graphically ?

- ❑ The land constraint changes
- ❑ The labour constraint changes
- ❑ The iso-income lines change

Change in the Objective Function slope (2)

Solution $X_1 = 20$
$X_2 = 30$
$Z = 27000$



$$\text{Max} \quad Z = 450\,X_1 + 600\,X_2$$

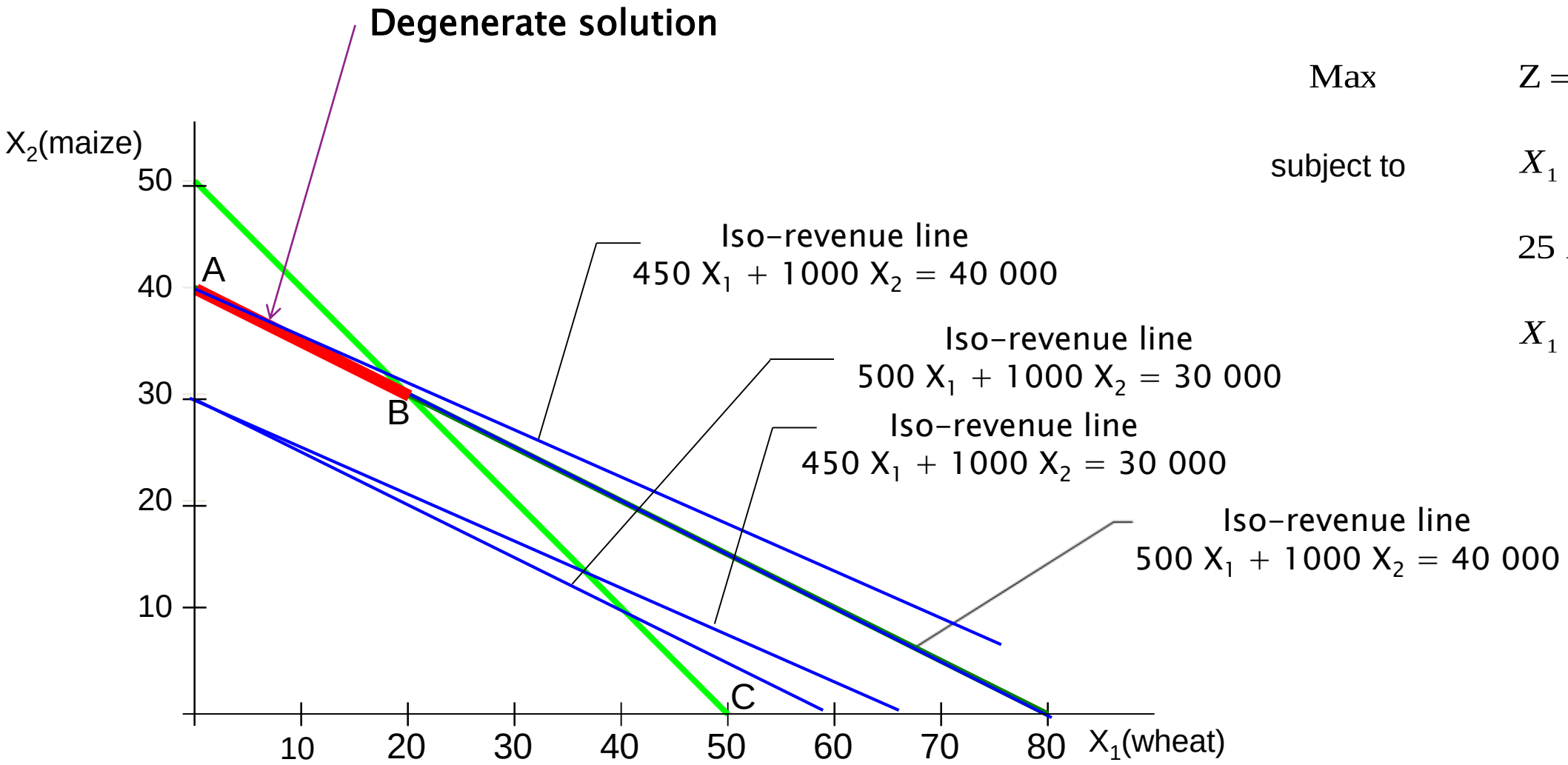
subject to

$$X_1 + X_2 \leq 50$$

$$25\,X_1 + 50\,X_2 \leq 2000$$

$$X_1 \geq 0\,;\; X_2 \geq 0$$

Multiple Solution



$$\text{Max} \quad Z = 500\,X_1 + 1000\,X_2$$

$$\text{subject to} \quad X_1 + X_2 \leq 50$$

$$25\,X_1 + 50\,X_2 \leq 2000$$

$$X_1 \geq 0\,;\, X_2 \geq 0$$